

REMARKS

Claims 1, 3-6 and 8-15 remain pending. Favorable reconsideration is respectfully requested.

The present invention relates to a polyether obtained by reacting 1-butene oxide and an alcohol in the presence of a double metal cyanide compound as a catalyst, where the content of unsaturated components is 8 mol% to 30 mol%. See Claim 1.

The rejection of the claims under 35 U.S.C. §103(a) over Vogel et al. in view of Combs et al. is respectfully traversed. The cited references fail to suggest the claimed polyester.

Vogel et al. disclose polyethers, but the reference is silent about the content of unsaturated components. Accordingly, the polyethers described therein could contain very, very little amounts unsaturated components or very, very large amounts.

Combs et al. on the other hand is explicit about the amount of unsaturated components. At column 2, lines 23-36, the reference states:

We surprisingly found that polyoxyalkylene monoethers containing **less than about 6 mole percent of alkoxyated unsaturates** offer substantial advantages for fuels. In particular, the monoethers have reduced water affinity and a substantially reduced tendency to form emulsions with water present in lipophilic systems. These advantages of the monoethers suggest better fuel solubility. We also surprisingly found that reducing the content of polyoxyalkylene diol impurities in the monoethers to **less than about 5 mole percent offers similar advantages**. By using deposit-control additives based on polyoxyalkylene monoethers of the invention, fuel formulators can offer better solutions for cleaner engines. [Emphasis added.]

At column 3, lines 21-32, the reference reads:

We surprisingly found, however, that the concentration of alkoxyated unsaturates is important, and that polyoxyalkylene monoethers that contain *less than about 6 mole percent of the alkoxyated unsaturates offer substantial advantages for fuels*, including reduced water affinity and a reduced tendency to emulsify with water in lipophilic systems. *More preferred polyoxyalkylene monoethers contain less than about 3 mole percent of alkoxyated unsaturates; most preferred are monoethers having less than about 1.5 mole percent of alkoxyated unsaturates.* [Emphasis added.]

Combs et al. explicitly disclose a polyether containing less than 6 mol% of unsaturated components. In fact, the reference clearly states that even lower amounts are preferred, i.e., even down as low as less than 1.5 mol%.

What the Office is appears to be doing is using Combs et al. to somehow argue that the polyether described by Vogel et al. inherently has 8 mol% or more of unsaturated components. However, there is absolutely no evidence for that conclusion.

Curiously, the Examiner states at the bottom of page 3 that “one...at the time the invention was made would reasonably believe that the polyethers disclosed by Vogel et al. have unsaturation levels of at least 6 mole percent.” However, the minimum value specified in Claim 1 is 8 mol%. No evidence has been provided to bridge that gap.

At lines 16 to 19 of column 3, Combs et al. disclose that polyoxyalkylenmonoethers are normally made by basic catalysis, and consequently, they include significant concentrations of alkoxyated unsaturates, typically propoxylated C₃-unsaturates. Therefore, Combs et al. disclose in column 3 that polyoxyalkylene monoethers are normally made by basic catalysis, and that they include significant concentrations of alkoxyated unsaturates, which are propoxylated C₃-unsaturates. Based on this disclosure, it is clear that only propylene oxide polymers are meant with polyoxyalkylenmonoethers, because otherwise no propoxylated C₃-unsaturates would be obtained. Therefore, Comb et al. disclose that if

polyoxyalkylene monoethers are prepared by propoxylation of an alcohol with propylene oxide in the presence of a basic catalyst, significant concentrations of alkoxyated unsaturates are obtained. In addition, Comb et al. disclose that these impurities were not believed to adversely effect the performance of polyoxyalkylene monoethers in fuels.

According to the Examiner, this disclosure would teach a person having ordinary skill in the art that polyoxyalkylene monoethers belonging to the state of the art according to Combs et al., are polyethers obtained by reacting 1-butene-oxide and an alcohol, wherein the content of unsaturated components is 8 mol% to 30 mol%. That is not correct. The disclosure in Combs et al. does not teach a person having ordinary skill in the art the polyether according to Claim 1 of the present application, because the teaching that polyoxyalkylene monoethers obtained from the reaction of an alcohol with propylene oxide in the presence of a basic catalyst give rise to high concentrations of alkoxyated unsaturates, does not point in the direction of polyethers obtained from 1-butene-oxide and an alcohol in the presence of a double-metal cyanide compound as a catalyst, having a content of unsaturated components of 8 mol% to 30 mol%.

At page 4 of the Office Action, the Examiner states that the instant claims are directed to product-by process claims, which are limited and defined by the process, non the less the determination of patentability is based on the product itself. Additionally, the Examiner states that Vogel et al. disclose polyethers made by reacting a butane oxide and an alcohol. In addition, in Claim 1 of the present application, a polyether is claimed, which is obtained by reacting 1-butene oxide and an alcohol. Consequently, according to the Examiner, the polyether according to Vogel et al. is the same as the polyether according to Claim 1 of the present application. This is incorrect.

In Table 1 on page 13 of the present specification different experiments are shown, in which 1-BO or PO are used as epoxides, and in which different catalysts, KOH or DMC are used. For example, if according to experiment 2 tridecanol is reacted with 1-BO in the presence of a DMC-catalyst, a high amount of unsaturated compounds of 28.8 mol-% is obtained. According to experiment 1, if tridecanol is reacted with 1-BO in the presence of KOH-catalysts, unsaturated compounds are only obtained in an amount of < mol-%. Therefore, Vogel et al. cannot teach any amount of unsaturated compounds, because Vogel et al. does not teach which catalyst is used for the production of the polyethers described therein. As shown by the experiments of the present description, the kind of catalyst, KOH or DMC, has a significant impact onto the amount of unsaturated compounds present in the polyether.

On page 5, the Examiner states that the disclosure of Combs et al. would cause that a person having ordinary skill in the art at the time the invention was made would reasonably believe that the polyethers of Vogel et al. are prepared via basic catalysis, since Combs et al. teach that base catalysis is the normal way by which polyoxyalkylene monoethers are prepared and implies that Vogel et al. is a prior art reference, which utilized this conventional means. This line of thought actually shows that Vogel et al. cannot disclose polyether obtained by reacting 1-butane oxide and an alcohol having a content of unsaturated components of 8 mol% to 30 mol%.

The Examiner states that the polyethers according to Vogel et al. are obtained by reacting 1-butene oxide and an alcohol in the presence of a base catalyst, for example KOH. As shown by the experiments in Table 1 on page 13 of the present specification, if an alcohol, for example tridecanol is reacted with 1-butene oxide in the presence of a base catalyst, for example KOH, a polyether is obtained having an amount of unsaturated compounds of <1 mol-%. Therefore, if the Examiner believes that Vogel et al. polyethers are obtained via base

catalyst, Vogel et al. cannot point in the direction of polyethers according to Claim 1 of the present application.

In view of the foregoing, the combination of Vogel et al. and Combs et al does not point in the direction of a polyether according to Claim 1 of the present application. The characteristic features which are missing in both documents, for example a polyether obtained by reacting 1-butene oxide and an alcohol having a high content of unsaturated components of 8 mol% to 30 mol%, which is obtained by synthesizing these polyethers in the presence of a DMC catalyst, cannot be taken from Vogel et al. and/or Combs et al. the conclusions which are taken by the Examiner would not be taken by a skilled artisan. If the Examiner's argument is followed, this would provide a polyether obtained by reacting 1-butene oxide and an alcohol having a very low amount of unsaturated components of < 1 mol%, as it could be shown by the experimental data in the description of the present application.

Accordingly, the claimed polyester is not obvious in view of the combination of Vogel et al. and Combs et al. Withdrawal of this ground of rejection is respectfully requested.

The rejection of the claims under 35 U.S.C. §112, first paragraph, is respectfully traversed.

Claim 6 specifies that an alcohol having 2 to 24 carbon atoms is reacted with 1-butene oxide in the presence of a double metal cyanide compound as catalyst. The Inventors have found that if an alcohol having 2 to 24 carbon atoms is reacted with 1-butene oxide under DMC catalysis, polyethers are obtained that have high amounts of unsaturates, e.g. as specified in Claim 1. The specification provides a detailed explanation of the procedure, and one would expect it to work as claimed. Therefore, on its fact, the specification of the present application provides an enabling disclosure for the claimed process.

Eleveld et al. teach that alkylene oxides chosen from ethylene oxide, propylene oxide, butane oxides, styrene oxide and the like and mixtures thereof can be polymerized in the presence of DMC-catalyst, to give a polyol having a molecular weight of, e.g., 3000, see Example 2 in column 10. Eleveld et al. do not disclose a process in which alcohols having 2 to 24 carbon atoms are alkoxyated with 1-butene oxide. Therefore, a person of ordinary skill in the art would not learn from Eleveld et al. that the reaction of alcohols having 2 to 24 carbon atoms with 1-butene oxide in the presence of a DMC catalyst gives rise to compounds having low amounts of unsaturates. In addition, Combs et al. disclose polyoxylene alkylene monoethers that are obtained by reaction of an alcohol with alkylene oxides chosen from propylene oxide, butane oxides and ethylene oxides, see column 2, lines 41 to 58 of Comb et al. Combs et al. teach that polyoxyalkylene monoethers that are prepared in the presence of a DMC-catalyst have very low concentrations of alkoxyated unsaturates, i.e. less than about 6 mol%, see column 3, lines 34 to 51 of the reference. According to the present invention, it has surprisingly been found that if a C₂-C₂₄-alcohol is alkoxyated with 1-butene oxide in the presence of a DMC-catalyst, polyether mixtures are obtained having high amount of 4.2 mol%, see Experiment 7 in Table 1 on page 13. The very specific combination of 1-butene oxide, a DMC catalyst and a C₂-C₂₄-alcohol gives rise to polyether mixtures having high amount of unsaturates of 8 mol% to 30 mol%, as claimed in Claim 6 of the present application. Therefore, Combs et al. cannot teach that this specific combination gives rise to polyether mixtures having a high amount of unsaturates.

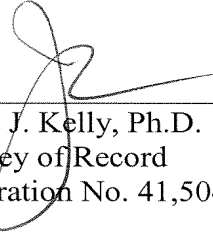
Accordingly, a person of ordinary skill in the art does get all of the information from Claim 6 that is needed in order to obtain polyether mixtures according to Claim 1 by the process according specified in Claim 6. The combination of al alcohol having 2 to 24 carbon atoms, 1-butene oxide and a DMC catalyst always provides the claimed amount of unsaturates.

Withdrawal of this ground of rejection is respectfully requested.

Applicants submit that the present application is in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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